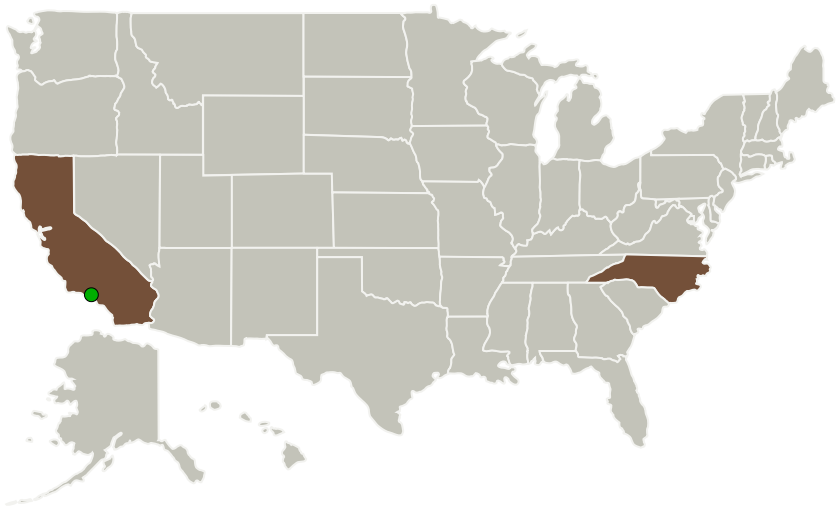
Six-Axis Force-Torque Transducer for Mars 2018 Mission, Phase II

Completed Technology Project (2014 - 2016)

Project Introduction

A transducer element that is hearty enough for a Mars lander mission needs to be developed so that a six-axis force and torque transducer is possible. The technical objectives are: 1. A transducer element capable of surviving temperatures from -135?C to +125?C. 2. The transducer element in objective 1 with temperature compensation to minimize span and offset drift from -80?C to +70?C. 3. The transducer element in objective 2 constructed so that it will sense properly in an atmospheric vacuum of 1E-5 torr. 4. The transducer element in objective 3 made of low-outgassing materials that are compatible with an interplanetary sample-collecting mission. 5. The transducer element in objective 4 instrumented with redundant sets of strain gages. In order to achieve the objectives, ATI Industrial Automation has divided the project into these tasks: * Six degree of freedom transducer design and fabrication, * Load fixture design and fabrication, * Instrumentation and temperature compensation of transducers - using semiconductor strain gages and - using metal-foil strain gages, * Calibration of instrumented beams and redundant instrumentation, * Performance characterization of both transducer instrumentation types at temperature and vacuum.

Primary U.S. Work Locations and Key Partners



Six-Axis Force-Torque Transducer for Mars 2018 Mission Project Image

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Organizations Performing Work	Role	Type	Location
ATI Industrial Automation, Inc.	Lead Organization	Industry	Apex, North Carolina
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	North Carolina

Images

Project Image
Six-Axis Force-Torque Transducer for Mars 2018 Mission Project Image
(https://techport.nasa.gov/image/131558)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
ATI Industrial Automation, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Dwayne Perry

Co-Investigator:
Dwayne Perry

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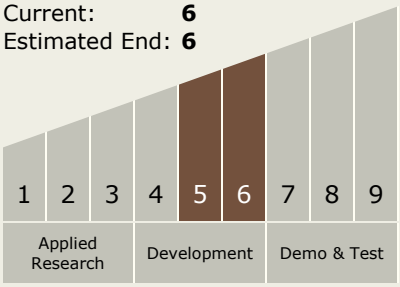
Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.1 Dexterous Manipulation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System